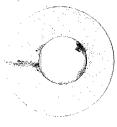
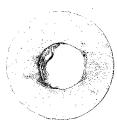


IDENTIFICATION

PRODUCT CODE: MAINDEC-08-D1EC-D
PRODUCT NAME: PDP-8, 8/I EXTENDED MEMORY
CHECKERBOARD
DATE CREATED: NOVEMBER 1, 1971
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: J. RICHARDSON - J. VROBEL

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CORPORATION**



1. ABSTRACT

The PDP-8, 8/I Extended Memory Checkerboard diagnostic is designed to provide worst case half-select noise conditions in order to determine the operational status of core memory. Four data patterns, and their complements, are written and checked for error. The patterns provided will generate the worst case noise conditions for a PDP-8 or 8/I equipped with standard or specially purchased core stacks, and will test systems equipped with from 8K to 32K words of core memory. Automatic program relocation is provided in order to test all memory stacks from each stack.

Teletype print-outs are provided for error identification. Also, the operator is given a degree of control over the program by various SR settings. These are explained in detail in Section 8.2.

2. REQUIREMENTS

2.1 Equipment

A standard PDP-8 or 8/I equipped with at least 8K words of core memory.

2.2 Storage

The program occupies locations 0010 to 3334.

2.3 Preliminary Programs

The Binary Loader must be in memory. Also, all diagnostics for a basic 4K PDP-8 must have been previously run successfully.

3. LOADING PROCEDURE

- a. Turn off the Teletype reader.
- b. Set the SR to 7777.
- c. Press LOAD ADDRESS; then START.
- d. Place the Binary tape in Teletype reader and turn on the reader.
- e. When the program has been loaded, stop the computer, turn off the reader, and remove the tape.

4. STARTING PROCEDURE

4.1 Starting Address

Start from address 200 to specify the amount of core memory to test; SR settings, and to receive a header print-out.

4.2 Restarting Address

Start from address 207 to change the test limits; SR settings, and to inhibit the header print-out.

4.3 Operator Action

Immediately after starting from address 200 or 207, the program will print TEST LIMITS. The operator must then specify, via the Teletype keyboard, the amount of core memory to test, followed by a carriage return.

The following rules govern the amount of memory to test:

- a. Type two octal numbers, separating the numbers with a comma. The first number signifies the lowest order 4K stack to test; the second signifies the highest order.
- b. The program expects the 4K stacks to be numbered sequentially starting with a stack 0.
- c. If the highest order stack to test is typed as the first stack, the program will interchange the two values so as to make the second value the first to test.
- d. After typing the second octal number, press the carriage return key to terminate the line.
- e. The program will test the lowest and highest order 4K stack specified, plus every stack between, starting with the lowest specified.
- f. Any single stack, or two or more sequential stacks may be specified.
- g. The stack containing the program may be included when specifying two or more stacks.

The stack containing the program will be tested after automatic program relocation takes place (see Section 5.3.1).

h. If a typing error is made, press the RUB-OUT key. TEST LIMITS will be printed again.

All previous input is disregarded.

For the following examples assume the program to be located in stack 0, and the program has been started from address 200 or 207. The amount of core memory available is 32K.

Example A:

TEST LIMITS

0,7_r (r denotes carriage return)

Example A indicates stacks 0, 1, 2, 3, 4, 5, 6 and 7 will be tested.

Example B:

TEST LIMITS

7,0_d

The program will perform exactly as Example A.

Example C:

TEST LIMITS

4,5_d

Only stacks 4 and 5 will be tested.

Example D:

TEST LIMITS

3,3_d

Stack 3 alone will be tested.

Example E:

TEST LIMITS

0,0 PROGRAM IS LOCATED IN FIELD 0

TEST LIMITS

0,1_d

Example E shows the message printed by the program when a single stack is selected which currently contains the program. TEST LIMITS is printed again, and the operator must then correct the test limits.

Operation of the program is unpredictable if the amount of memory selected for testing exceeds the actual amount available, i.e., selecting 32K for testing on a PDP-8 or 8/I equipped with a maximum of 28K.

4.3.1 Setup SR

After the test limit is specified, the program will print SETUP SR. For normal program operation, the SR must be set to equal 0000₈. Press the carriage return key after setting the SR to 0000. The program will then run until stopped by the operator. Normal program operation is defined as performing all four checkerboard patterns on all of available memory from every memory stack.

5. OPERATING PROCEDURE

5.1 Program and Operator Action

- a. Load the program into stack 0 using the procedure described in Section 3.
- b. Set the SR to 200; press LOAD ADDRESS, and then start.
- c. The message TEST LIMITS will be printed. Specify the limits, via keyboard, as described in Section 4.3.
- d. The message SETUP SR will be printed. Set the SR to 0000_8 , and press the carriage return key.
- e. The program will perform all four tests on all of core memory specified, after which, automatic program relocation takes place.

5.2 Operational Switch Settings

Normal operation of the program requires the SR set to 0000_8 . Refer to Section 8.2, applications, for switch settings provided for trouble-shooting.

5.3 Subroutine Abstracts

5.3.1 Program Relocation

Program relocation is governed entirely by the amount of core memory selected for testing. Under certain conditions the program will not relocate at all, but will remain in the current 4K stack to perform the tests (see below). The program first relocates to the highest order 4K stack under test. From there it relocates to the next lower stack (after performing all four tests). The program keeps relocating to the next lower stack until it reaches the lowest order stack under test. The testing and relocation cycle is then repeated.

The contents of the entire 4K stack are relocated. This enables the RIM Loader, and any other information to be carried with the program.

The program provides a degree of protection for itself by recording the first error encountered in any stack. When a faulty stack is next in sequence to contain the program, the program will skip the faulty stack and relocate to the first lower order stack which is error-free. If all lower order stacks are faulty, program relocation will not take place. The tests will be run again from the current stack. Relocation will resume when an error-free stack is found.

Also, the program will not relocate if any of the conditions described below exist.

- a. Only one 4K stack is selected for testing.
- b. SR 9 is on a 1 to inhibit relocation (see Section 8.2.6).

The INSTRUCTION FIELD indicators will indicate the current stack containing the program.

5.3.2 The Checkerboard Patterns

Four test patterns, and their complements, are used to test memory. All memory stacks, except the one with the program, are tested with one pattern before the next test is executed.

Any one, or any combination, of the four tests may be run by placing one, or any combination, of SR 3, 4, 5, or 6 on a 1 after the message SETUP SR is printed. The test specified by the most significant switch on a 1 will be executed first. SR 3, 4, 5 and 6 all on a 0 will enable all tests to be run. SR 3= test 1; 4= test 2; 5= test 3; 6= test 4.

The following steps are performed by each of the four tests:

- a. Write the pattern once in all stacks selected for testing; starting with the lowest order stack.
- b. Select the lowest order stack and perform a read, complement data, write sequence once on each location, until all 4K has been complemented.
- c. Repeat step b 31 more times. The stack will end up with the pattern originally loaded.
- No error checking has been performed as yet.
- d. Read 4-word segments and complement each segment 4 times; then read each of the 4 words and check for error.
- e. After checking the entire 4K stack for errors, repeat step d again. This time stall for a random period of time after reading and checking every 400₈ word block. The maximum stall is 18.4 ms; the minimum is 3 μ s.
- f. Setup for the next sequential 4K stack and repeat steps b through f.

When all selected stacks have been checked the next test in sequence is executed, and steps a through f repeated. Program relocation takes place after the fourth test is executed in this manner.

The patterns generated by each test are shown below. The matrices represent portions of one bit plane.

Test 1:

		y-axis	y-axis
		x-axis	x-axis
0000	0 0 1 1 0 0 1 1	1 1 0 0 1 1 0 0	
x-axis	0 0 1 1 0 0 1 1	1 1 0 0 1 1 0 0	
0300	1 1 0 0 1 1 0 0	0 0 1 1 0 0 1 1	
	↓	↓	↓

Test 2:

	y-axis		y-axis
0000	0 0 1 1 0 0 1 1	1 1 0 0 1 1 0 0	1 1 0 0 1 1 0 0
x-axis	1 1 0 0 1 1 0 0	0 0 1 1 0 0 1 1	0 0 1 1 0 0 1 1
0300	0 0 1 1 0 0 1 1	1 1 0 0 1 1 0 0	1 1 0 0 1 1 0 0

Test 3:

	y-axis		y-axis
0000	1 0 0 1 1 0 0 1	0 1 1 0 0 1 1 0	0 1 1 0 0 1 1 0
x-axis	0 1 1 0 0 1 1 0	1 0 0 1 1 0 0 1	1 0 0 1 1 0 0 1
0300	1 0 0 1 1 0 0 1	0 1 1 0 0 1 1 0	0 1 1 0 0 1 1 0

Test 4:

	y-axis		y-axis
0000	0 1 1 0 0 1 1 0	1 0 0 1 1 0 0 1	1 0 0 1 1 0 0 1
x-axis	0 1 1 0 0 1 1 0	1 0 0 1 1 0 0 1	0 1 1 0 0 1 1 0
0300	1 0 0 1 1 0 0 1	0 1 1 0 0 1 1 0	0 1 1 0 0 1 1 0

6.

ERRORS

Starting the program from address 200 will give a header print-out after the SR has been setup.

The header identifies the information printed when a data error is found. The header appears as:

FIELD	OCTAL ADR.	GOOD	BAD	TEST
-------	------------	------	-----	------

Where: FIELD = an octal number (0 to 7) indicating the 4K field containing the error.

OCTAL ADR. = the memory address which contains the incorrect data.

GOOD = what the data in octal, should have been. This will always equal 0000 or 7777.

BAD = the data as read. This will equal the good data except for one or more bits complemented.

TEST = the number (1 to 4) of the test which detected the error.

After each error print-out the program continues on with the next sequential memory location.

6.1 Error Halts and Description

Placing SR 0 on a 1 during an error print-out will cause a halt at location 2641.
Press CONTINUE to resume testing.

7. RESTRICTIONS

7.1 Starting Restrictions

Start from address 200 to indicate the amount of core memory to test; to setup the SR and to receive a header print-out.

Starting from 207 requires the same operator action, but no header will be printed.

7.2 Operating Restrictions

None

8. MISCELLANEOUS

8.1 Execution Time

The time required to perform all four tests on one 4K memory stack is approximately 26 seconds.

8.2 Applications

For operating convenience, and as an aid to trouble-shooting, the SR may be used to control the program. The switch assignments and their effect on the program are described below. Please note that it is important that the program should be halted before changing the test selection switches. These switches are not sensed by the program during testing.

Halting the program with SR 0 is preferred, rather than with the STOP key. Using the STOP key may result in a halt while the program is in the process of relocating, which is disasterous.

8.2.1 Halt after Test or Error - SR 0

Placing SR 0 on a 1 at any time while the program is running will cause a halt after the current test is completed. The MB will equal 2461 in the current stack containing the program. Press CONTINUE to resume testing, or restart from 200 or 207 to enter new parameters.

Placing SR 0 on a 1 during an error type-out will also cause a halt at location 2461. Proceed exactly as described in the above paragraph.

8.2.2 Inhibit Error Print-out - SR 1

Placing SR 1 on a 1 causes all error print-outs to be inhibited. All other messages will not be inhibited. The program will continue to recognize errors, but will not print any information. SR 1 may be placed on a 1 or 0 while the program is running.

8.2.3 Bell on Error - SR 2

SR 2 on a 1 causes the program to ring the TTY BELL whenever an error is detected. This is convenient when testing with power supply margins. SR 2 has precedence over SR 1 if both should happen to be on a 1. SR 2 may be placed on a 1 or 0 while the program is running.

8.2.4 Test Selection SR 3 through 6

Any one, or any combination of tests may be executed by placing any one or any combination of SR 3 through 6 on a 1. Test selections may be made only when starting from 200 or 207. SR 3 specifies test 1; SR 4 test 2; SR 5 test 3; SR 6 test 4. The test specified by the most significant SR on a 1 will be executed first.

For most PDP-8s, SR 4 will provide the worst case pattern. For most PDP-8/Is, SR 5 will provide the worst case pattern.

If all four switches are on a 0, all four tests will be executed in order starting with test 1.

Program relocation is not effected, regardless of the SR settings.

8.2.5 Inhibit Program Relocation - SR 7

The program normally relocates automatically as indicated by the INSTRUCTION FIELD indicators. To retain the program in its current 4K field, place SR 7 on a 1 at any time. Changing SR 7 to a 0 will permit relocation to resume.

8.2.6 SR 8, 9 and 10 - Not Used

8.2.7 Change TEST LIMITS and SR - SR 11

Placing SR 11 on a 1 will cause the program to automatically restart from address 207. The TEST LIMITS and SR may then be changed. SR 11 is sensed only after all specified tests have been completed on all of memory under test.

8.2.8 Loop on Address

A subroutine is provided which may be used to continuously loop on a single location, or a group of consecutive locations. No error checking is performed. The routine performs a read, and immediately follows with a write, on each location. The loop time between two reads, or two writes, is approximately 22.5 μ s.

Operating Procedure:

- a. Set the INSTRUCTION FIELD switches to the current field, and the SR to 1700.
- b. Set the DATA FIELD switches to equal the 4K field number to test.
- c. Press LOAD ADDRESS.
- d. Set the SR to equal the first address of the group.
- e. Press START. A halt will occur at 1703. Set the SR to equal the last address of the group.
- f. Press CONTINUE. The address(s) specified will be looped until stopped by the operator with STOP. SR 0 will not halt this routine.

To resume normal operation, restart the program from 200 or 207 of the current field.

9. PROGRAM DESCRIPTION

The PDP-8, 8/I Extended Memory Checkerboard diagnostic is designed to create worst case memory noise conditions on systems equipped with 8K to 32K words of memory. The program executes four checkerboard patterns, plus their complements, on each 4K memory field. In addition, the program automatically relocates from field to field in order to test all 4K fields from every 4K field. Under normal operation, the amount of core memory tested at one time is that specified by the operator minus the 4K field containing the program. A TTY keyboard input routine is provided to enable the operator to specify the exact number of 4K fields to be tested. A print-out is provided for each error detected by the program.

Further control of the program is given to the operator by means of the SR. The operator may halt the program, inhibit error print-outs, substitute the TTY BELL for error indication, halt after error print-out, select any one or a group of tests, inhibit program relocation, and create an automatic restart to change the amount of memory to test.

A small subroutine is provided which will continuously read and write any single, or a group of locations within any 4K field. The operator must specify the locations by means of the SR.

/PDP-9, 81, 85 EXTENDED MEMORY CHECKBOARD TEST.
/COPYRIGHT 1971, DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
/START AT 200, RESTART AT 211 TO SKIP HEADER.
/MIN. OF 8K OF CORE REQUIRED.

0001

六

10

6201	CDF #6201	0
6202	CIF #6202	0
6214	RDP #6214	0
6224	RIF #6224	0
0004	0000	0
0005	0000	0
0006	0000	0
0007	0000	0
45350010	0000	0
45350011	0000	0
24020012	0000	0
0013	0000	0
0014	0000	0
0015	0000	0
0016	0000	0
0017	0000	0
0020	0022	0
0021	0032	0
0022	0022	0
0023	7600	0
0024	7600	0
0025	7600	0
0026	7600	0
0027	7600	0
0030	7600	0
0031	7600	0
0032	7600	0
0033	0000	0
0034	0010	0
0035	0740	0
0036	0400	0
0037	0200	0
0040	2100	0
0041	0040	0
0042	0020	0
0043	2207	0
0044	0300	0
0045	0400	0
0046	0452	0
0047	0600	0
0052	3000	0
0051	2200	0
0052	2261	0
0740	140	0
MCW,	0	0
K10,	10	0
K740,	740	0
K400,	400	0
K200,	200	0
K100,	100	0
K40,	40	0
K20,	20	0
XLMTS,	0	0
XTST1,	0	0
XTST2,	0	0
XTST3,	0	0
XTST4,	0	0
XMOVE,	0	0
XSETU,	0	0
SETU1,	0	0
261	0	0

*

0053	2262	<262,	262
0054	2263	<263,	263
0055	2264	<264,	264
0056	7760	<22,	7760

02 6 / 0062 0000 TNUM .
 0063 1607 XBANK .
 0064 0652 W0011 CBANK
 0065 0667 W1100 X0011 .
 0066 0704 W0110 X1100 .
 0067 0721 W1001 X1001 .
 0070 1600 XKBNK .
 0071 1624 XTBNK .
 COUNT .
 0072 0000 FLCNT .
 0073 0000 LOOP .
 0074 0000 XRALL .
 0075 0736 RDALL .
 0076 1037 RCHK1 .
 0077 1054 RCHK1C .
 0100 1071 RCHK2 .
 0101 1106 RCHK2C .
 0102 1123 RCHK3 .
 0103 1140 RCHK3C .
 0104 1200 RCHK4 .
 0105 1217 RCHK4C .
 0106 1056 TDM20 .
 0107 1097 TDM40 .
 0110 4515 JMS1 .
 0111 4516 JMS2 .
 0112 4517 JMS3 .
 0113 4520 JMS4 .
 0114 4552 JMS5 .
 0115 1245 XRD1 .
 0116 1322 XRD2 .
 0117 1400 XRD3 .
 0120 1455 XRD4 .
 0121 2000 XRROR .
 0122 0000 MEMADR .
 0123 0000 FIRST1 .
 /D 0124 0000 LAST1 .
 0125 6201 KCDF .
 0126 6202 KCIF .
 0127 2641 XHLT .
 0130 0213 XRTN .
 0131 1646 XFILD .
 0132 2146 XPRER .
 0133 0007 K7 .
 0134 0000 CHAR .
 0135 2474 XHAR .
 0136 2146 XPERR .
 0137 2115 XPING .
 SPING

0140 7764 *14,
 0141 7770 *12,
 0142 0260 X260,
 0143 0215 X215,
 0144 0377 K377,
 0145 0372 K370,
 0146 0277 K277,
 0147 2154 XCRLF,
 0150 0001 K1,
 0151 0000 NXLOC,
 0152 2702 XSALL,
 0153 0000 STALL,
 0154 2166 EXIT,
 0320 LASTX,
 0155 0000 LASTX,
 0156 0000 LASTX,
 0157 0000 LASTX,
 0158 0000 LASTX,
 0159 0000 LASTX,
 0160 0000 LASTX,
 0161 0000 LASTX,
 0162 0000 LASTX,
 0163 0000 LASTX,
 0164 0000 LASTX,
 0165 0000 LASTX,
 0166 0000 LASTX,
 0167 0000 LASTX,
 0168 0000 LASTX,
 0169 0000 LASTX,
 0170 0000 LASTX,
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 0193 0000 LASTX,
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 0198 0000 LASTX,
 0199 0000 LASTX,
 0200 0000 LASTX,
 0201 0000 LASTX,
 0202 0000 LASTX,
 0203 0000 LASTX,
 0204 0000 LASTX,
 0205 0000 LASTX,
 0206 0000 LASTX,
 0207 0000 LASTX,
 0208 0000 LASTX,
 0209 0000 LASTX,
 0210 0000 LASTX,
 0211 4443 RSTR1,
 0212 4677 RTN1,
 0213 6224 RTN1,
 0214 3016 RTN1,
 0215 4531 RTN1,
 0216 1141 RTN1,
 0217 3074 RTN1,
 0218 7600 ALAW,
 0219 1220 TAD ALAW,
 0220 2022 ISE ERWRD,
 0221 3422 DCA I ERWRD,
 0222 0224 ISE LOOP,
 0223 3422 ISE LOOP,
 0224 2074 JMP ALAW,
 0225 5220 TAD ALAW,
 0226 1220 DCA I LASTX,
 0227 3554 TAD ERTBL,
 0228 1020 DCA ERWRD,
 0229 3022 EXAMINE SR
 0230 1033 TAD MCWA
 0231 0232 AND K740
 0233 0035 SZA
 0234 7440 JMP EXAM1
 0235 5241 TAD MCWA
 0236 1033 TAD K740
 0237 1035 /SET ALL TEST BITS

*200 BEGIN, *OF
 DCA FLAGS
 RIF
 DCA INSFLD
 JMS I XLMTS
 JMS I XSTS
 JMS I XHDR
 JMP RTN1
 /RESTART HERE
 RSTR1, JMS I XLMTS
 JMS I XSTS
 RIF
 DCA INSFLD
 JMS I XFILD
 TAD M10
 DCA LOOP
 0220 7600 ALAW,
 0221 1220 TAD ALAW,
 0222 2022 ISE ERWRD,
 0223 3422 DCA I ERWRD,
 0224 2074 ISE LOOP,
 0225 5220 JMP ALAW,
 0226 1220 TAD ALAW,
 0227 3554 DCA I LASTX,
 0228 1020 TAD ERTBL,
 0229 3022 DCA ERWRD,
 0230 1033 EXAMINE SR
 0231 0232 TAD MCWA
 0233 AND K740
 0234 SZA
 0235 JMP EXAM1
 0236 TAD MCWA
 0237 TAD K740

/SET TEST LIMITS
 /SETUP SR
 /READ INSTRUCTION FIELD
 /CURRENT FIELD
 /*=10
 /RESTART HERE
 RSTR1, JMS I XLMTS
 JMS I XSTS
 RIF
 DCA INSFLD
 JMS I XFILD
 TAD M10
 DCA LOOP
 0220 7600 ALAW,
 0221 1220 TAD ALAW,
 0222 2022 ISE ERWRD,
 0223 3422 DCA I ERWRD,
 0224 2074 ISE LOOP,
 0225 5220 JMP ALAW,
 0226 1220 TAD ALAW,
 0227 3554 DCA I LASTX,
 0228 1020 TAD ERTBL,
 0229 3022 DCA ERWRD,
 0230 1033 EXAMINE SR
 0231 0232 TAD MCWA
 0233 AND K740
 0234 SZA
 0235 JMP EXAM1
 0236 TAD MCWA
 0237 TAD K740

/SET TEST LIMITS
 /SETUP SR
 /READ INSTRUCTION FIELD
 /CURRENT FIELD
 /*=10
 /RESTART HERE
 RSTR1, JMS I XLMTS
 JMS I XSTS
 RIF
 DCA INSFLD
 JMS I XFILD
 TAD M10
 DCA LOOP
 0220 7600 ALAW,
 0221 1220 TAD ALAW,
 0222 2022 ISE ERWRD,
 0223 3422 DCA I ERWRD,
 0224 2074 ISE LOOP,
 0225 5220 JMP ALAW,
 0226 1220 TAD ALAW,
 0227 3554 DCA I LASTX,
 0228 1020 TAD ERTBL,
 0229 3022 DCA ERWRD,
 0230 1033 EXAMINE SR
 0231 0232 TAD MCWA
 0233 AND K740
 0234 SZA
 0235 JMP EXAM1
 0236 TAD MCWA
 0237 TAD K740

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0242 3033 DCA MCWA /SAVE
0241 7200 EXAMI, CLA MCWA
0242 1033 TAD MCWA
0243 0036 AND K420
0244 7440 SZA /TEST 1 IF NO SKIP
0245 5444 EXAM2, JMP I XTST1
0246 7202 CLA MCWA
0247 1033 TAD MCWA
0250 0037 AND K200 /TEST 2 IF NO SKIP
0251 7440 SZA /TEST 3 IF NO SKIP
0252 5445 EXAM3, JMP I XTST2
0253 7200 CLA MCWA
0254 1033 TAD MCWA
0255 0040 AND K100 /TEST 4 IF NO SKIP
0256 7440 SZA /TEST 5 IF NO SKIP
0257 5446 EXAM4, JMP I XTST3
0260 7200 CLA MCWA
0261 1033 TAD MCWA
0262 0041 AND K40 /INHIBIT MOVE IF A 1
0263 7440 SZA /TEST 6 IF NO SKIP
0264 5447 JMP I XTST4
0265 4531 JMS I XFILD /RESTORE DATA FIELD

0266 7604 LAS
0267 0150 AND K1 /CHECK SR #1
0270 7440 SZA
0271 5211 JMP RSTRT1
0272 7604 LAS
0273 0042 AND K20 /INHIBIT MOVE IF A 1
0274 7440 SZA /GO RELOCATE
0275 5213 JMP RTN1
0276 5450 JMP I XMOVE

0277 2645 XSTSR, SETSR

/ TEST 1. WRITE CHECKER PATTERN #1.
/ TST1, JMS I XSETU /SET OF TO 1ST FIELD
CLB
TAD K261 /TEST NUMBER
DCA TNUM
CMA 10 /SET ADDRESS COUNT TO 7777
DCA 10 /SEE IF FIELD HAS PROGRAM
JMS I XBANK /NO. BEGIN WRITING
SKP /DONE ALL. NOW READ ALL
JMP EXIT
TAD KXT1
DCA EXIT
JMS I X0011 /WRITE 0011
JMS I X0011 /WRITE 0011 64 TIMES
JMS I X1100 /WRITE 1100 128 TIMES
JMS I X1100

0300 4451
0301 7200
0302 1052
0303 3062
0304 7040
0305 3010
0306 4463
0307 7410
0310 5322
0311 1345
0312 3153
0313 4464
0314 4464
0315 4465
0316 4465

HAL10 V141 2*NOV=71 2119 PAGE 1*4
 0317 5313 JMP !=4 /KEEP WRITING
 0320 4471 XIT1, JMS ! XTBNK /SETUP FOR NEXT FIELD
 0321 5304 JMP TST1+4
 0322 4476 EXT1, JMS ! XCHK1 /READ EACH FIELD AND CHECK
 /FOR ERRORS,
 0323 5324 JMP TST1C /NOW WRITE COMPLEMENT
 /
 /WRITE COMPLEMENT OF PATTERN 1
 /
 TST1C, JMS ! XSETU /SEE DF TO 1ST FIELD.
 CLA CMA
 DCA 10 /SET ADDRESS COUNT TO 7777
 JMS ! XBANK /SEE IF FIELD HAS PROGRAM
 SKP
 JMP EXT1C /ALL DONE, READ ALL
 TAD KXT1C
 DCA EXIT
 JMS ! X1100 /WRITE 1100
 JMS ! X1100 /WRITE 1100 16 TIMES
 0334 4465 0335 4465 JMS ! X0011 /WRITE 0011 128 TIMES
 0336 4464 0337 4464 JMS ! X0011 /KEEP WRITING
 0340 5334 TST1C, JMS ! XTBNK /SETUP FOR NEXT FIELD
 0341 4471 0342 5325 JMP TST1C+1
 /
 0343 4477 EXT1C, JMS ! XCHK1C /READ EACH BANK AND CHECK
 /FOR ERRORS!
 0344 5246 JMP EXAM2 /SEE IF TEST 2 IS SELECTED
 0345 0329 KXT1, XIT1
 0346 0341 KXT1C, XIT1C
 /
 /TEST 2. WRITE CHECKER PATTERN #2
 /
 0400 4451 \$400 /
 0401 7200 TST2, JMS ! XSETU /SET DF FOR 1ST FIELD
 0402 1053 CLA TNUM /TEST #
 0403 3062 TAD K262
 0404 7240 DCA CMA /SET ADDRESS COUNT TO 7777
 0405 3010 DCA 10 /SEE IF FIELD HAS PROGRAM
 0406 4463 JMS ! XBANK /NO. BEGIN WRITING
 0407 7410 SKP JMP EXT2 /DONE ALL, NOW READ ALL
 0410 5223 TAD KXT2
 0411 1250 DCA EXIT
 0412 3153 JMS ! X0011 /WRITE 0011
 0413 4464 0414 4465 JMS ! X1100 /WRITE 1100 128 TIMES
 0415 4465 0416 4464 JMS ! X1100 /WRITE 0011 128 TIMES
 0417 4464

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/
0420 5214 JMP ¹"4 JMS 1 XTBNK /SETUP FOR NEXT FIELD
0421 4471 XIT2, JMP TST2+4
0422 5224 JMS 1 XCHK2 /READ EACH FIELD AND CHECK
0423 4502 EXT2, JMP TST2C /NOW WRITE COMPLEMENT
0424 5225 /WRITE COMPLEMENT OF PATTERN 2

0425 4451 TST2C, JMS 1 XSETU /SET UP FOR FIRST FIELD
0426 7240 CLA CMA /SET ADR, COUNT TO 7777
0427 3010 DCA 10 /SEE IF FIELD HAS PROGRAM
0430 4463 JMS 1 XBANK /WRITE
0431 7410 SKP EXT2C /GO READ
0432 5245 TAD KXT2C
0433 1251 DCA EXIT
0434 3153 JMS 1 X1100 /WRITE 1100
0435 4465 JMS 1 X0011 /WRITE 0011 128 TIMES
0436 4464 JMS 1 X0011
0437 4464 JMS 1 X1100 /WRITE 1100 128 TIMES
0440 4465 JMS 1 X1100 /WRITE 1100 128 TIMES
0441 4465 JMS 1 X1100 /WRITE 1100 128 TIMES
0442 5236 JMS ¹"4 TST2C, JMS 1 XTBNK /SETUP FOR NEXT FIELD
0443 4471 XIT2C, JMP TST2C+1 /SEE IF TEST 3 IS SELECTED
0444 5226 /TEST 3. WRITE CHECKER PATTERN #3

0445 4501 EXT2C, JMS 1 XCHK2C /READ EACH FIELD AND CHECK
0446 5647 JMP 1 .+1 /SEE IF TEST 3 IS SELECTED
0447 0253 EXAM3

0450 0421 KXT2, XIT2C, XIT2C
0451 0443 KXT2C, XIT2C

0452 4451 TST3, JMS 1 XSETU /SETUP FOR 1ST FIELD
0453 7200 CLA K263 /TEST NUMBER
0454 1054 TAD TNUM
0455 3062 DCA CMA /SET ADR, COUNT TO 7777
0456 7240 DCA 10 /SEE IF FIELD HAS PROGRAM
0457 3010 JMS 1 XBANK /WRITE
0460 4463 SKP EXT3 /GO READ
0461 7410 TAD KXT3
0462 5275 DCA EXIT
0463 1322 JMS 1 X1001 /WRITE 1001
0464 3153 0465 4467 JMS 1 X0110 /WRITE 0110 128 TIMES
0466 4466 JMS 1 X0110 /WRITE 0110 128 TIMES
0467 4466 JMS 1 X1001 /WRITE 1001 128 TIMES
0470 4467 JMS 1 X1001 /WRITE 1001 128 TIMES
0471 4467 JMS 1 X1001 /SETUP FOR NEXT FIELD
0472 5266 JMS 1 XTBNK
0473 4471 XIT3,

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```
2474 5256           JMP TST3+4

0475 4502           EXT3,    JMS 1 XCHK3 /READ EACH FIELD AND CHECK
2475 5277           JMP TST3C /WRITE COMPLEMENT

/ WRITE COMPLEMENT OF PATTERN 3

/ TST3C,    JMS 1 XSETU /SETUP OF FOR 1ST FIELD
0477 4451           CLA CMA
0500 7240           DCA 10 /SET ADR, COUNT TO 7777
0501 3010           JMS 1 XBANK /SEE IF FIELD HAS PROGRAM
0502 4463           SKP      /WRITE
0503 7410           JMP EXT3C /READ ALL
0504 5317           TAD KXT3C
0505 1323           DCA EXIT
0506 3153           DCA EXIT /WRITE 0110
0507 4466           JMS 1 X0110 /WRITE 1001 128 TIMES
0510 4467           JMS 1 X1001
0511 4467           JMS 1 X1001 /WRITE 0110 128 TIMES
0512 4466           JMS 1 X0110
0513 4466           JMS 1 X0110 /WRITE 0110 128 TIMES
0514 5310           JMP 1 *4
0515 4471           X1T3C,   JMS 1 XTBANK /SETUP FOR NEXT FIELD
0516 5300           JMP TST3C+1

0517 4503           EXT3C,   JMS 1 XCHK3 /READ EACH FIELD AND CHECK
0520 5721           JMP 1 .+1 /SEE IF TEST 4 IS SELECTED
0521 0260           EXAM4

/ KXT3,    XIT3,   XIT3C
0522 0473           KXT3,
0523 0515           KXT3C,  XIT3C

/TEST 4. WRITE PATTERN #4

0600
/ TST4,    JMS 1 XSETU /SET OF FOR 1ST FIELD
0600 4451           CLA K264 /TEST NUMBER
0601 7200           TAD TNUM
0602 1055           DCA CMA
0603 3062           CLA CMA /SET ADR, COUNT TO 7777
0604 7240           DCA 10 /SEE IF FIELD HAS PROGRAM
0605 3010           JMS 1 XBANK /WRITE
0606 4463           SKP      /GO READ
0607 7410           JMP EXT4
0610 5223           TAD KXT4
0611 1245           DCA EXIT
0612 3153           JMS 1 X0110 /WRITE 0110
0613 4466           JMS 1 X0110 /WRITE 0110 64 TIMES
0614 4466           JMS 1 X1001 /WRITE 1001 128 TIMES
0615 4467           JMS 1 X1001
0616 4467           JMS 1 X2110 /WRITE
0617 4466           JMS 1 X2110 /SETUP FOR NEXT FIELD
0621 5214           JMP 1 X1T4,
```

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```
0622 5204           JMP TST4+4  
0623 4504           EXT4, JMS I XCHK4 /READ EACH FIELD AND CHECK  
0624 5225           JMP TST4C /SEE IF FIELD HAS PROGRAM  
                   /WRITE COMPLEMENT  
                   /WRITE COMPLEMENT OF PATTERN 4  
                   /  
0625 4451           TST4C, JMS I XSETU /SET DF FOR FIRST  
0626 7240           CLA CMA /SET ADR, COUNT TO 7777  
0627 3010           DCA 10 /SEE IF FIELD HAS PROGRAM  
0630 4463           JMS I XBANK /WRITE  
0631 7410           SKP /READ  
0632 5247           JMP EXT4C  
0633 1246           TAD KXT4C  
0634 3153           DCA EXIT  
0635 4467           JMS I X1001 /WRITE 1001 64 TIMES  
0636 4466           JMS I X1001 /WRITE X0110 128 TIMES  
0637 4466           JMS I X0110  
0640 4466           JMS I X0110  
0641 4467           JMS I X1001  
0642 5236           JMP *4 /SETUP FOR NEXT FIELD  
0643 4471           X1T4C, JMS I XTBNK  
0644 5226           JMP TST4C+1  
                   /  
0645 0621           KXT4, X1T4  
0646 0643           KXT4C, X1T4C  
                   /  
0647 4505           EXT4C, JMS I XCHK4C /READ EACH FIELD AND CHECK  
0650 5651           JMP 1 :+1 /SEE IF READY TO MOVE  
0651 0265           EXAM4+5  
                   /ROUTINE TO WRITE 0011  
                   /  
0652 0000           W0011, 0 TAD M20  
0653 1056           DCA COUNT /0  
0654 3072           DCA 1 10 /0  
0655 3410           DCA 1 10 /1  
0656 3410           DCA 1 10 /1  
0657 7040           CMA 1 10 /1  
0660 3410           DCA 1 10 /1  
0661 7040           CMA 1 10 /1  
0662 3410           DCA 1 10 /1  
0663 2072           ISE COUNT /COUNT = *16 OR *32  
0664 5255           JMP W0011+3 /LOOP  
0665 4470           JMS I XKBNK /SEE IF END OF FIELD  
0666 5652           JMP I W0011 /EXIT  
                   /ROUTINE TO WRITE 1100  
                   /  
0667 0000           W1100, 0 TAD M20  
0670 1056           DCA COUNT /1  
0671 3072           CMA 1 10 /1  
0672 7040           DCA 1 10 /1  
0673 3410           DCA 1 10 /1
```

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```
0674 7040 CMA          /1
0675 3410 DCA 1 10   /0
0676 3410 DCA 1 10   /0
0677 3410 DCA 1 10   /0
0700 2072 ISZ COUNT  /16 OR =32
0701 5272 JMP W1100+3 /LOOP
0702 4470 JMS I XKBNK /SEE IF END OF FIELD
0703 5667 JMP I W1100 /EXIT
```

/ROUTINE TO WRITE 0110

```
0704 0000 W0110, 0 TAD M20
0705 1056 DCA COUNT  /0
0706 3072 DCA 1 10
0707 3410 CMA          /1
0710 7040 DCA 1 10
0711 3410 CMA          /1
0712 7040 DCA 1 10
0713 3410 DCA 1 10
0714 3410 DCA 1 10
0715 2072 ISZ COUNT  /16 OR =32
0716 5307 JMP W0110+3 /SEE IF END OF FIELD
0717 4470 JMS I XKBNK /EXIT
0720 5704 JMP I W0110
```

/ROUTINE TO WRITE 1001

```
0721 0000 W1001, 0 TAD M20
0722 1056 DCA COUNT  /1
0723 3072 CMA          /0
0724 7040 DCA 1 10
0725 3410 DCA 1 10
0726 3410 DCA 1 10
0727 3410 DCA 1 10
0730 7040 CMA          /1
0731 3410 DCA 1 10
0732 2072 ISZ COUNT  /16 TO =32
0733 5324 JMP W1001+3 /LOOP
0734 4470 JMS I XKBNK /SEE IF END OF FIELD
0735 5721 JMP I W1001 /EXIT
```

/ROUTINE TO WRITE 1001

```
/ROUTINE TO READ ALL OF MEMORY 8 TIMES! COMPLEMENTING
/THE PATTERN EACH PASS; NO ERROR CHECKING IS DONE.
RDALL, 0
0736 0000 CLA          /32 DECIMAL
0737 7200 TAD M40    /COUNTS PASSES THRU MEMORY
0740 1057 DCA COUNT
0741 3072 CLA CMA
0742 7240 DCA 10
0743 3010 CMA
0744 7040 /SET ADR. REGS. TO 777
```

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! /SETUP ROUTINES FOR RCHKA

```

    / RCHK1, 0
  1037 0000 1110 TAD JMS1 /JMS1 = JMS I XRD1
  1040 3211 DCA RLOPA
  1041 3211 TAD JMS1 /JMS1 = JMS I XRD1
  1042 1110 DCA RLOPA+1
  1043 3212 DCA RLOPA+2
  1044 1111 TAD JMS2
  1045 3213 DCA RLOPA+2
  1046 1111 TAD JMS2
  1047 3214 DCA RLOPA+3
  1050 1110 TAD JMS1
  1051 3215 DCA RLOPA+4
  1052 4200 JMS RCHKA /EXIT /GO READ
  1053 5637 JMP 1 RCHK1

  1054 0000 /RCHK1C, 0
  1055 1111 TAD JMS2 /JMS2 = JMS I XRD2
  1056 3211 DCA RLOPA
  1057 1111 TAD JMS2
  1060 3212 DCA RLOPA+1
  1061 1110 TAD JMS1
  1062 3213 DCA RLOPA+2
  1063 1110 TAD JMS1
  1064 3214 DCA RLOPA+3
  1065 1111 TAD JMS2
  1066 3215 DCA RLOPA+4
  1067 4200 JMS RCHKA /EXIT /GO READ
  1070 5654 JMP 1 RCHK1C /EXIT

  1071 0000 /RCHK2, 0
  1072 1110 TAD JMS1 /JMS1 = JMS I XRD1
  1073 3211 DCA RLOPA /JMS I XRD2
  1074 1111 TAD JMS2
  1075 3212 DCA RLOPA+1
  1076 1111 TAD JMS2
  1077 3213 DCA RLOPA+2
  1078 1110 TAD JMS1
  1079 3214 DCA RLOPA+3
  1080 1110 TAD JMS1
  1081 3215 DCA RLOPA+4
  1082 4200 JMS RCHKA /EXIT /GO READ
  1085 5671 JMP 1 RCHK2 /EXIT

  1106 0000 /RCHK2C, 0
  1107 1111 TAD JMS2
  1110 3211 DCA RLOPA
  1111 1110 TAD JMS1 /JMS I XRD1
  1112 3212 DCA RLOPA+1
  1113 1110 TAD JMS1
  1114 3213 DCA RLOPA+2
  1115 1111 TAD JMS2
  1116 3214 DCA RLOPA+3
  1117 1111 TAD JMS2
  1120 3215 DCA RLOPA+4
  1121 4200 JMS RCHKA /GO READ

```

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1122 5706 JMP I RCHK2C /EXIT

1123 0000 RCHK3, 0 TAD JMS4 /JMS I XR03
1124 1113 DCA RLOPA /JMS I XR03
1125 3211 TAD JMS3 /JMS I XR03
1126 1112 DCA RLCPA+1 /JMS I XR03
1127 3212 TAD JMS3 /JMS I XR03
1128 1112 DCA RLOPA+2 /JMS I XR03
1129 3213 TAD JMS4 /JMS I XR03
1130 1113 DCA RLOPA+3 /JMS I XR03
1131 3214 TAD JMS4 /JMS I XR03
1132 1113 DCA RLOPA+4 /GO READ
1133 3214 TAD JMS4 /JMS I XR03
1134 1113 DCA RLOPA+4 /GO READ
1135 3215 JMS RCHKA /EXIT
1136 4200 JMP I RCHK3 /EXIT
1137 5723

1140 0000 RCHK3C, 0 TAD JMS3 /JMS I XR03
1141 1112 DCA RLOPA /JMS I XR03
1142 3211 TAD JMS4 /JMS I XR03
1143 1113 DCA RLOPA+1 /JMS I XR03
1144 3212 TAD JMS4 /JMS I XR03
1145 1113 DCA RLOPA+2 /JMS I XR03
1146 3213 TAD JMS3 /JMS I XR03
1147 1112 DCA RLOPA+3 /JMS I XR03
1148 3214 TAD JMS3 /JMS I XR03
1149 3214 DCA RLOPA+4 /GO READ
1150 1112 TAD JMS3 /JMS I XR03
1151 1112 DCA RLOPA+4 /GO READ
1152 3215 JMS RCHKA /EXIT
1153 4200 JMP I RCHK3C /EXIT
1154 5740

1200 *1200 RCHK4, 0
1201 0000 JMS I XFILD /JMS I XR03
1202 1112 TAD JMS3 /JMS I XR03
1203 3637 DCA I XLOPA /JMS I XR03
1204 1112 TAD JMS3 /JMS I XR03
1205 3640 DCA I XLOPB /JMS I XR03
1206 1113 TAD JMS4 /JMS I XR03
1207 3641 DCA I XLOPC /JMS I XR03
1210 1113 TAD JMS4 /JMS I XR03
1211 3642 DCA I XLOPD /JMS I XR03
1212 1112 DCA I XLOPE /JMS I XR03
1213 3643 JMS I XCFL /JMS I XR03
1214 4644 JMS I XCHKA /EXIT
1215 4636 JMP I RCHK4 /EXIT
1216 5600

1217 0000 RCHK4C, 0 JMS I XFILD /JMS I XR03
1220 4531 TAD JMS4 /JMS I XR03
1221 1113 DCA I XLOPA /JMS I XR03
1222 3637 TAD JMS4 /JMS I XR03
1223 1113

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```
1224 3640      DCA 1 XLOPB  
1225 1112      TAD JMS3  
1226 3641      DCA 1 XLOPC  
1227 1112      TAD JMS3  
1230 3642      DCA 1 XLOPD  
1231 1113      TAD JMS4  
1232 3643      DCA 1 XLORE  
1233 4644      JNS 1 XCFL  
1234 4636      JNS 1 XCHKA  
1235 5617      JMP 1 RCHK4C /EXIT /GO READ  
  
1236 1000      XCHKA, RCHKA  
1237 1011      XLOPA, RLOPA  
1240 1012      XLOPB, RLOPA+1  
1241 1013      XLOPC, RLOPA+2  
1242 1014      XLOPD, RLOPA+3  
1243 1015      XLOPE, RLOPA+4  
1244 1722      XCFL, CFLD  
  
PAUSE
```

/81-88 EXTENDED CHECKERBOARD - TAPE 2

/READ ROUTINES FOR 00111 11001 01110 AND 10011

```
0000 0000      RD1, 0 TAD M20, /=16  
1245 0000      TAD M20, /=16  
1246 1036      DCA COUNT /=4  
1247 3072      TAD M4 /=4  
1248 1060      DCA FLCNT /=8  
1249 3073      TAD M10 /=8  
1250 1141      CLP1,  
1251 3074      TAD M10 /=8  
1252 1141      DCA LDOP  
1253 3074      TAD 1 MEMADR  
1254 1522      CMA  
1255 7040      DCA 1 MEMADR /COMPLEMENT 8 TIMES  
1256 3522      ISZ LOOP  
1257 2074      JMP /=4  
1258 2074      ISZ FLCNT  
1259 5254      SKP /=4  
1260 5254      ISZ MEMADR  
1261 2073      JMP CLOP1 /DONE 4 ADRS, WHEN SKIP  
1262 7410      SKP /=3  
1263 5252      ISZ MEMADR  
1264 2122      JMP CLOP1 /  
1265 5252      TAD MEMADR  
1266 1122      TAD M4 /SUBTRACT 4  
1267 1060      DCA 10 /NOW USE AUTO-INDEX  
1268 3010      CLL  
1269 7100      TAD 1 10  
1270 7100      SZA  
1271 7100      JMS 1 XRROR /PRINT ERROR  
1272 1410      CLL  
1273 7440      TAD 1 10  
1274 4521      SZA  
1275 7100      JMS 1 XRROR /PRINT ERROR  
1276 1410      CLL  
1277 7440      TAD 1 10  
1278 7440      SZA  
1300 4521      JMS 1 XRROR /PRINT ERROR
```

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1301 7120 STL
1302 1410 TAD I 10 /1
1303 7040 CMA
1304 7440 SZA JMS I XRROR /PRINT ERROR
1305 4521 STL
1306 7120 TAD I 10 /1
1307 1410 CMA
1310 7040 SZA JMS I XRROR /PRINT ERROR
1311 7440 STL
1312 4521 TAD I 10 /1
1313 2072 COUNT ISZ
1314 5320 *4 JMP
1315 4470 JMS I XKBNK /SEE IF END OF FIELD
1316 2122 ISZ MEMADR
1317 5645 JMP I RD1 /KEEP READING
1320 2122 ISZ MEMADR
1321 5250 JMP RD1+3 /
1322 0000 RD2,
1323 1056 TAD M20 /#16
1324 3072 DCA COUNT /#4
1325 1060 TAD M4 /
1326 3073 DCA FLCNT /#8
1327 1141 CLOP2,
1330 3074 TAD M10 /
1331 1522 DCA LOOP /READ
1332 7040 TAD I MEMADR /
1333 3522 DCA I MEMADR /COMPLEMENT 4 TIMES
1334 2074 ISZ LOOP /
1335 5331 *4 JMP
1336 2073 ISZ FLCNT /DONE 4 ADRS. WHEN SKIP
1337 7410 SKP
1340 5343 JMP *3 ISZ MEMADR
1341 2122 JMP CLOP2 /INCREMENT ADDRESS
1342 5327 /
1343 1122 TAD MEMADR
1344 1060 TAD M4 /NOW USE AUTO-INDEX
1345 3010 DCA 10 /1
1346 7120 STL
1347 1410 TAD I 10 /1
1350 7040 CMA
1351 7440 SZA JMS I XRROR /PRINT ERROR
1352 4521 STL
1353 7120 TAD I 10 /1
1354 1410 CMA
1355 7040 SZA JMS I XRROR /PRINT ERROR
1356 7440 CLL
1357 4521 CLL
1360 7100 TAD I 10 /1
1361 1410

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1362	7440	SZA	/0	
1363	4521	JMS I XRROR	/PRINT ERROR	
1364	7100	CLL		
1365	1410	TAD I 10		
1366	7440	SZA	/0	
1367	4521	JMS I XRROR	/PRINT ERROR	
1370	2072	ISZ COUNT		
1371	5375	JMP *4		
1372	4470	JMS I XKBNK		
1373	2122	ISZ MEMADR		
1374	5722	JMP I RD2		
1375	2122	ISZ MEMADR	/KEEP READING	
1376	5325	JMP RD2+3		
		/		
1400	0000	*1400		
1401	1056	/RD3,		
1402	3072	0 TAD M20		
1403	1060	DCA COUNT		
1404	3073	TAD M4	/04	
1405	1141	DCA FLCNT		
1406	3074	TAD M10	/08	
1407	1522	DCA LOOP		
1410	7040	TAD I MEMADR	/READ	
1411	3522	CMA I MEMADR		
1412	2674	DCA I MEMADR	/COMPLEMENT 8 TIMES	
1413	5207	ISZ LOOP		
1414	2073	JMP *4		
1415	7410	ISZ FLCNT	/DONE 4 IF 0	
1416	5221	SKP		
1417	2122	JMP *3		
1420	5205	ISZ MEMADR		
		JMP CLOPS	/DO NEXT	
1421	1122	TAD MEMADR		
1422	1060	TAD M4	/USE AUTO=INDEX	
1423	3010	DCA 10		
1424	7100	CLL		
1425	1410	TAD I 10		
1426	7440	SZA	/0	
1427	4521	JMS I XRROR	/PRINT ERROR	
1430	7120	STL		
1431	1410	TAD I 10		
1432	7040	CMA	/1	
1433	7440	SZA		
1434	4521	JMS I XRROR	/PRINT ERROR	
1435	7120	STL		
1436	1410	TAD I 10		
1437	7040	CMA	/1	
1440	7440	SZA		
1441	4521	JMS I XRROR	/PRINT ERROR	
1442	7100	CLL		

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1443	1410	TAD I 10	/0
1444	7440	SEA JMS I XRROR	/PRINT ERROR
1445	4521	JMS I COUNT	
1446	2072	ISZ COUNT	
1447	5253	JMP *4	
1450	4470	JMS I XKBKN	/SEE IF END OF FIELD
1451	2122	MEMADR	
1452	5600	JMP I RD3	
1453	2122	ISZ MEMADR	
1454	5203	JMP RD3+3	

1455	0000	TAD M20	/=16
1456	1056	DCA COUNT	
1457	3072	TAD M4	/=4
1460	1060	DCA FLCNT	
1461	3073	TAD M10	/=8
1462	1141	DCA LOOP	
1463	3074	TAD I MEMADR	
1464	1522	CMA	
1465	7040	DCA I MEMADR	
1466	3522	TAD I MEMADR	
1467	2074	ISZ LOOP	
1470	5264	JMP *4	
1471	2073	ISZ FLCNT	
1472	7410	SKP *4	
1473	5276	JMP *4	
1474	2122	ISZ MEMADR	
1475	5262	JMP CLOP4	
1476	1122	TAD MEMADR	
1477	1060	TAD M4	
1498	3010	DCA 10	
1501	7120	STL	
1502	1410	TAD I 10	/1
1503	7040	CMA	
1504	7440	SEA JMS I XRROR	/PRINT ERROR
1505	4521	JCLL	
1506	7100	TAD I 10	/0
1507	1410	SZA JMS I XRROR	/PRINT ERROR
1510	7440	JCLL	
1511	4521	TAD I 10	/0
1512	7100	SZA JMS I XRROR	/PRINT ERROR
1513	1410	JCLL	
1514	7440	TAD I 10	/0
1515	4521	SZA JMS I XRROR	/PRINT ERROR
1516	7120	JCLL	
1517	1410	TAD I 10	/1
1520	7040	CMA	
1521	7440	SEA JMS I XRROR	/PRINT ERROR
1522	4521	ISZ COUNT	
1523	2072	JMP *4	
1524	5330	JMS I XKBKN	/SEE IF END OF FIELD

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1526 2122 ISZ MEMADR
1527 5655 JMP 1 RD4

1530 2122 ISZ MEMADR
1531 5260 JMP RD4+3

/ ROUTINE TO CHECK FOR END OF FIELD

*1600 CKBNK, 0
1600 0000 CLA 10
1601 7200 TAD 10
1602 1010 CMA
1603 7240 SZA CLA
1604 7640 SZA CLA
1605 5602 JMP 1 CKBNK
1606 5553 JMP 1 EXIT

/ ROUTINE TO SEE IF TESTED FIELD HAS PROGRAM

1607 0000 CBANK, 0 RIF /READ INST. FIELD
1610 6224 DCA SAVIF /SAVE
1611 3223 RDF /READ DATA FIELD
1612 6214 CIA
1613 7041 TAD SAVIF
1614 1223 SZA CLA /EQUAL, IF ACE@
1615 7640 JMP 1 CBANK /DOESN'T HAVE PROGRAM
1616 5607 JMS 1 XTBANK /INCREMENT DATA FIELD
1617 4471 JMP 1 CBANK /TEST NEW FIELD
1620 5607 ISZ CBANK /DONE ALL CAUSE PROGRAM NOW
1621 2207 CIA
1622 5607 JMP 1 CBANK /IN HIGHEST FIELD
1623 0000 SAVIF, 0 /EXIT

/ ROUTINE TO SET DF FOR NEXT FIELD

NXTBNK, 0 CLA
1624 0000 RDF /READ DATA FIELD
1625 7200 CIA
1626 6214 TAD LAST1 /C(LAST1) = LAST TO TEST
1627 7041 SZA CLA /ALL DONE IF @
1630 1124 JMP *3
1631 7640 ISZ NXTBNK
1632 5235 JMP *4
1633 2224 RDF /INCREMENT DATA FIELD
1634 5242 JMP *6
1635 6214 TAD K12 /ADD ,6201
1636 1034 TAD KCOF
1637 1125 DCA *1
1640 3241 CDF *0
1641 6201 /CHANGE TO NEW DATA FIELD

(2)

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/CHECK SWITCH REGISTER

1642 7634 LAS CLA /CHEC HALT
 1643 7712 SPA CLA /GO HALT, SR0=1
 1644 4527 JMS I XHLT /EXIT
 1645 5624 JMP I NXTANK

/RESTORE DATA FIELD AND CHECK SR

/ FIELD, 0

1646 0000 CLA
 1647 7200 CLA
 1650 6214 RDF
 1651 3014 DATFLD /SAVE TESTED FIELD#
 1652 6224 DCA
 1653 1125 TAD KCDF
 1654 3255 DCA *+1 /MAKE DATA AND INST FIELD EQUAL
 1655 6201 CDF 00
 1656 7200 CLA
 1657 5646 JMP I FEILD

1700 /
 1700 *1700 /

/START HERE TO LOOP ON ADDRESS

1700 7200 CLA /READ LOWER LIMIT
 1701 7604 LAS FIRST1
 1702 3123 DCA FIRST1 /NOW SETUP UPPER LIMIT
 1703 7402 HLT
 1704 7604 LAS
 1705 3124 DCA LAST1
 1706 1123 OVER. TAD FIRST1
 1707 3122 DCA MEMADR
 1710 1522 WRLOP, TAD I MEMADR /READ
 1711 3522 DCA I MEMADR /WRITE
 1712 1122 TAD MEMADR
 1713 7041 CIA
 1714 1124 TAD LAST1
 1715 7650 SNA CLA
 1716 5306 JMP OVER
 1717 2122 ISZ MEMADR
 1720 5310 JMP WRLOP
 1721 7402 HLT

/ CFLD. 0

1722 0000 CLA /TEST FIELD
 1723 7202 TAD DATFLD
 1724 1014 TAD KCDF
 1725 1125 DCA *+1 /RESTORE TEST FIELD
 1726 3327 CDF 00
 1727 6201 CLA
 1730 7202 JMP I CFLD /EXIT
 1731 5722

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PARENT ERROR ROUTINE

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CMA DCA /SAVE BAD DATA

SAVE GOOD DATA

אַמְּנָה בְּרוּךְ יְהוָה!

YAD 10
DCA OCADR
/OCTAL ADDRESS

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        JNS 1 XFILE /RESTORE DATA FIELD  
        TAD DATFLD /DATA FIELD
```

/LAST = FIELD WI
SIA TAD LAST

0015	7650	SNA	CLA	/SAME IF 0
0016	5233	JMP	SW2	/DON'T STORE

TAD DATFLD
DEA LAST

/TABLE_POINTER

END OF TABLE 1E @ 0

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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/RESTORE POINTER

INCREMENT POINT
DAIFLD 1014 0030
ERWRD 2022 0031

032 34422 DEA I ERARD STORE IN TABLE

LAS
RTL

/SR2 6N A 1 # RING BELL
SMA CLA
JMP SW1

RING BELL

041 5311 JMP SW2
042 7604 SW1, LAS

10043 7004 /SERIAL NO PRINT
10044 7700

045 5254 EREXT. JMP EPRTNT
046 1014 TAD DATEID

ENCLAS TAD KCDF
213 1817 TAD KCDF
047 1125 DCA 41
053 7251

/SET TO TESTED FIELD

032 /200 CEA
053 5600 JMP I ERROR

/CR/LF
TEST NUMBERED

TEST NUMBER
1014
1012
1011
1010
1009
1008
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1005
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1003
1002
1001

PAL12

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2119

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PRINT

```

2262 1142 TAD K260
2261 4346 JMS PRERR
2262 1142 TAD M14 /*12 DECIMAL
2263 3274 DCA LOOP
2264 4312 JMS SPING
2265 1365 TAD OCADR
2266 3134 DCA CHAR
2267 4326 JMS PROCTL
2268 1141 TAD M10 /*8 DECIMAL
2269 3074 DCA LOOP
2270 4315 JMS SPING /SPACE 8
2271 1364 TAD GOOD
2272 3134 DCA CHAR
2273 4326 JMS PROCTL /PRINT
2274 1061 TAD M5 /*5
2275 3074 DCA LOOP
2276 4315 JMS SPING /SPACE 5
2277 1061 TAD MS
2278 3134 DCA CHAR
2279 4326 JMS PROCTL /PRINT
2280 1061 TAD M5
2281 3074 DCA LOOP
2282 4315 JMS SPING /SPACE 5
2283 1062 TAD TNUM
2284 4346 JMS PRERR /TEST NUMBER
2285 4326 JMS PROCTL /PRINT
2286 1061 TAD M5
2287 3134 DCA CHAR
2288 4326 JMS PROCTL /PRINT
2289 1061 TAD M5
2290 3074 DCA LOOP
2291 4315 JMS SPING /TEST NUMBER
2292 1062 TAD TNUM
2293 4346 JMS PRERR /PRINT
2294 4326 JMS PROCTL /PRINT
2295 1061 TAD M5
2296 3134 DCA LOOP
2297 4326 JMS PROCTL /PRINT
2298 1061 TAD M5
2299 3074 DCA LOOP
2300 4315 JMS SPING /TEST NUMBER
2301 1061 TAD TNUM
2302 4346 JMS PRERR /PRINT
2303 4326 JMS PROCTL /PRINT
2304 1061 TAD M5
2305 3074 DCA LOOP
2306 4315 JMS SPING /TEST NUMBER
2307 1062 TAD TNUM
2308 4346 JMS PRERR /PRINT
2309 4326 JMS PROCTL /PRINT
2310 1061 TAD M5
2311 4315 JMS SPING /TEST NUMBER
2312 4527 POSITN, TAD CHAR
2313 5246 CLL RAL
2314 5715 CLA CHAR
2315 0000 SPING, 0 /PRINT SPACES
2316 1370 TAD K240
2317 6046 TLS
2318 5041 TSF
2319 5320 JMP *1
2320 2074 ISZ LOOP
2321 5317 JMP SPING*2
2322 7200 CLA I SPING /EXIT
2323 5715 JMP I SPING /EXIT
2324 7200 CLA I SPING /EXIT
2325 5715 JMP I SPING /EXIT
2326 2000 PROCTL, 2 /PRINT OCTAL
2327 1060 TAD M4 /*4
2328 3074 DCA LOOP /DIGIT COUNTER
2329 1134 POSITN, TAD CHAR
2330 7104 CLL RAL
2331 7006 RTL
2332 3134 DCA CHAR

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PAL10 V141 2*NOV=71 0119 PAGE 1=20

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2135 1134 TAD CHAR
2136 7004 RAL
2137 5133 AND K7
2140 1142 TAD K260
2141 4346 JMS PRERR
2142 2074 ISZ LOOP
2143 5331 JMP POSITN /00 NEXT
2144 7200 CLA
2145 5726 JMP I PROCTL /EXIT

/PRINT A NUMBER
PRERR, 0 TLS
2147 6046 TSF
2150 6041 JMP :+1
2151 5350 CLA
2152 7200 JMP I PRERR /EXIT
2153 5746 /CARRIAGE RETURN, LINE FEED

/CRLF, 0 CLA
2155 7200 TAD K215
2156 1143 JMS PRERR
2157 4346 TAD K212
2158 1371 JMS PRERR
2161 4346 JMP I CRLF
2162 5754

/          BAD, 0
2163 0000 GOOD, 0
2164 0000 OCADR, 0
2165 0000 LAST, 0
2166 0000 K207, 207
2167 0207 K240, 240
2170 0240 K212, 212
2171 0212

2200 *2200
/ROUTINE TO SET DF TO FIRST TEST FIELD
SETU1, 0 CLA FIRST1 /FIRST TO TEST
2200 0000 TAD FIRST1
2201 7200 TAD KCDF
2202 1123 DCA ,+1
2203 1125 CDF 00 /CHANGE TO TEST FIELD
2204 3205 JMP I SETU1 /EXIT
2205 6201 /ROUTINE TO ACCEPT TEST LIMITS FROM
2206 5600 /KEYBOARD INPUT
```

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0119

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2207 0000 SLMTS, 2 JMS I XFIELD /CR, LF
 2210 4531 JMS I XCRLF /PRINT TEST LIMITS
 2211 4547 JMS I XTLM /CR, LF
 2212 4751 JMS I XCRLF /GO ACCEPT INPUT
 2213 4547 JMS KEYIN /SEE IF IT'S LEGAL
 2214 4303 JMS LEGAL
 2215 4314 TAD CHAR
 2216 1134 AND K7
 2217 0133 CLL RAL
 2220 7104 RTL POSITION TO AC 6=8
 2221 7006 DCA FIRST1 /FIRST TO TEST
 2222 3123 JMS KEYIN /WAIT FOR COMMA
 2223 4303 TAD CHAR
 2224 1134 CIA
 2225 7041 TAD K254 /MASK AC 9=11
 2226 1353 SNA /OK IF 0
 2227 7450 JMP *3 PRINT QUESTION MARK
 2230 5233 JMS QUERY
 2231 4344 JMP SLMTS+2
 2232 5211 JMS KEYIN
 2233 4303 JMS LEGAL
 2234 4314 TAD CHAR
 2235 1134 AND K7
 2236 0133 CLL RAL
 2237 7104 RTL POSITION TO AC 6=8
 2240 7006 DCA LAST1 /LAST TO TEST
 2241 3124 TAD FIRST1
 2242 1123 CIA
 2243 7041 TAD LAST1 /FIRST IS > LAST IF NEG
 2244 1124 SMA
 2245 7500 JMP OKAS
 2246 5236 CLA
 2247 7200
 2250 1123 TAD FIRST1 /SEE IF EQUAL
 2251 3134 DCA CHAR /YES IF 0
 2252 1124 TAD LAST1 /LAST NOW IS FIRST
 2253 3123 DCA FIRST1
 2254 1134 TAD CHAR
 2255 3124 DCA LAST1 /FIRST IS NOW LAST
 2256 7200 OKAS, CIA
 2257 1124 TAD LAST1
 2260 7041 TAD FIRST1
 2261 1123 SZA
 2262 7440 JMP ALOK /CURRENT FIELD
 2263 5273 TAD FIRST1 /NO IF A 1
 2264 1123 CIA
 2265 7041 TAD INSLFD /PRINT PROGRAM LOCATION
 2266 1016 SZA CLA
 2267 7640 JMP ALOK /AND START OVER
 2270 5273 JMS I XLCAT /WAIT FOR C.R.
 2271 4752 JMS SLMTS+2
 2272 5211 JMS KEYIN
 2273 4303 ALOK,

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2274 1134 TAD CHAR
2275 7041 CIA
2276 1143 TAD K215 /NOT A C.R., IF A SKIP
2277 7450 SNA
2300 5607 JMP I SLMTS
2301 4344 JMS QUERY
2302 5211 JMP SLMTS+2 /PRINT QUESTION MARK

/ KEYIN, 0
2303 0000 KCC
2304 6032 KSF
2305 6031 JMP .=1
2306 5305 KRB
2307 6036 DCA CHAR
2310 3134 TAD CHAR
2311 1134 JNS I XPERR
2312 4536 JMP I KEVIN
2313 5703

69//

2314 0000 TAD CHAR
2315 1134 CIA
2316 7041 K377 /RUB=OUT IF 0
2317 1144 SNA CLA
2320 7650 JMP SLMTS+2
2321 5211 TAD CHAR
2322 1134 AND K370
2323 0145 CIA
2324 7041 TAD K260
2325 1142 SNA CLA
2326 7650 JMP I LEGAL
2327 5714 TAD CHAR
2330 1134 CIA
2331 7041 TAD K254
2332 1353 SNA CLA /A COMMA IF 0
2333 7650 JMP I LEGAL
2334 5714 TAD CHAR
2335 1134 CIA
2336 7041 TAD K215
2337 1143 SNA CLA /A C.R., IF 0
2340 7650 JMP I LEGAL
2341 5714 JMS QUERY /QUERY
2342 4344 JMP SLMTS+2 /START OVER
2343 5211

/ QUERY, 0
2344 0000 JMS I XCRLF
2345 4547 TAD K277 /PRINT QUERY MARK
2346 1146 JMS I XPERR
2347 4536 JMP I QUERY
2350 5744

/ XTLM, TLIMT
2351 2446 XLCAT, LOCAT
2352 2402 254
2353 0254 254

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/ PRINT FIELD PROGRAM IS IN
/ *2402
/ LOCAT, 2 CLA INSFLD /CURRENT FIELD
2400 00000 72000
2401 7016 RTR
2402 10112 RAR
2403 70110 AND K7
2404 01333 TAD K260
2405 11442 DCA FLDN /FLDN = PRGAM+25
2406 11444 TAD PRGAM
2407 12117 DCA 12
2410 30112 TAD 12
2411 14112 PLOCT, SNA /DONE IF 0
2412 14112 TAD 1 12
2413 74500 JMP I LOCAT /EXIT
2414 56000 JHS I XPERR /PRINT
2415 45356 JMP PLOCT
2416 52112

2417 2417 PRGAM, 320 /P
2420 03220 322 /R
2421 03222 317 /O
2422 03117 307 /G
2423 03017 302 /R
2424 03222 301 /A
2425 03011 315 /M
2426 03115 315 /H
2427 0240 240 //I
2428 03111 311 //S
2429 03233 323 //I
2430 0240 240 //N
2431 0323 323 //F
2432 0240 240 //I
2433 0311 311 //E
2434 0316 316 //L
2435 0240 240 //D
2436 0306 306 //I
2437 0311 311 //E
2438 0305 305 //L
2439 0314 314 //D
2440 0304 304 //D
2441 0314 314 //D
2442 0304 304 //D
2443 0240 240 //X
2444 00000 FLDN, 0 //TERMINATOR
2445 00000

2446 00000 TLIMT, 0 /PRINT TEST LIMITS
2447 72000 CLA TSTL
2450 1257 TAD 12
2451 30112 DCA 12
2452 14112 PLIMT, TAD 1 12
2453 74500 SNA /DONE IF 0
2454 5646 JMP I TLIMT /DONE IF 0

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2455 4536 JMS I XPERR
2456 5252 JMP PLINT

2457 2457 /TSTL, 324 /T
2460 2324 305 /E
2461 2305 323 /S
2462 2323 324 /T
2463 0324 240 /L
2464 0240 314 /I
2465 0314 311 /W
2466 0311 315 /I
2467 0315 311 /I
2470 2311 324 /T
2471 0324 323 /S
2472 0323 0 TERMINATOR

/HEADER ROUTINE

2474 0000 PHDR, 0 /CR, LF
2475 4547 JMS I XCRLF /CR, LF
2476 1332 TAD FILD
2477 3012 DCA 12 /PRINT FIELD
2500 1412 PFIELD, TAD 1 12 /DONE IF 0
2501 7450 SNA 1+3 /
2502 5305 JMP 1 XPERR
2503 4536 JMS I PFILD
2504 5300 TAD MS
2505 1061 DCA LOOP
2506 3074 JMS I XPING
2507 4537 /SPACE 5
2510 1341 TAD OTLDR
2511 3012 DCA 12

2512 1412 POCOR, TAD 1 12 /PRINT OCTAL ADR
2513 7450 SNA 1+3 /DONE IF 0
2514 5317 JMP 1 XPERR
2515 4536 JMS I POCOR
2516 5312 / TAD MS
2517 1061 DCA LOOP
2520 3074 JMS I XPING
2521 4537 /SPACE 5
2522 1355 TAD GOOD
2523 3012 PGOOD, DCA 12 /PRINT GOOD
2524 1412 TAD 1 12 /DONE IF 0
2525 7450 JMP 1 XPERR
2526 5731 JMS I PGOOD
2527 4536 BSPACE /NEXT PAGE
2530 5324 306 /
2531 2600 306 /F
2532 2532 306 /F
2533 3306

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2534 0311 2541 2541
2535 0305 2542 0317
2536 2314 2543 0303
2537 0304 2544 0324
2540 0000 2545 0301
2546 0314 2547 0240
2550 0301 2551 0304
2552 0322 2553 0256
2554 0000 2555 2555
2556 0307 2557 0317
2560 0317 2561 0304
2562 0000 2563 5674
2600 *2600 2601 1061
2602 4537 2603 1234
2604 3012 2605 1412
2606 7450 2607 5212
2610 4536 2611 5205
2612 1061 2613 3074
2614 4537 2615 1226
2616 3012 2617 1412
2620 7450 2621 5224
2622 4536 2623 5217
2624 4547 2625 5644

/1 /E /L /D

/OTLDR, 317 303 324 304 314 240 301 304 322 256 0 /GOOD, 307 317 304 0 /EXHDR, JMP I PHDR
/SPCE, TAD MS DCA LOOP JMS I XPING /SPACE 5
PBAD, TAD BADD DCA 12 TAD I 12 SNA /DONE IF 0
/PRINT BAD
/SPCE, TAD MS DCA LOOP JMS I XPING /SPACE 5
PTSTN, TAD 12 SNA /PRINT TEST /DONE IF 0
JMP I XPERR
JMP PBAD
TAD MS
/SPCE, TAD MS DCA LOOP JMS I XPING /SPACE 5
PTSTN, TAD 12 SNA /PRINT TEST /DONE IF 0
JMS I XPERR
JMP PTSTN
JMS I XCRLF
JMP I XPHDR

/CR, LF /EXIT

```

2626 2626 TSTN, 324 /T
2627 2324 305 /E
2630 0305 323 /S
2631 0323 324 /T
2632 0324 0
2633 0000 /
2634 2634 BADD, 302 /B
2635 0302 301 /A
2636 0301 304 /D
2637 0304 0
2640 0000 /
2641 0000 HALT, 0
2642 7402 HLT
2643 5641 JMP ! HALT /RESTART HERE OR RTRN1
2644 2563 XPHDR, EXHDR

/
// WAIT HERE TO SETUP SR, TYPE CARRIAGE RETURN
// AFTER SETTING SR,
/
SETSR, 0 JMS ! XFILD /RESTORE DATA FIELD
        JMS ! XCRLF /CR, LF
        TAD STSR
        DCA 12
        TAD ! 12 /DONE IF 0
        SNA
        JMP ! *3
        JMS ! XPERR
        PSTSR
        KRB
        KSF
        JMP ! *4
        KR
        JMS ! XPERR
        JMP ! SETSR
        LAS
        DCA MCWA
        JMP WTCR
        STSR, 323 /S
        0323 305 /E
        0324 324 /U
        0325 325 /P
        0322 322
        240
        240
        323 /S

```

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PAL10 V141 2*NOV*71 2119 /R
2700 2322 322
2701 0000 0

2702 0000 /STALL, 2 JMS I XFIELD
2703 4531 JMS GENRAN /GET ANOTHER
2704 4316 DCA LOOP
2705 3074 ISZ LOOP /16.5 MS MAX.
2706 2074
2707 5326 JMP "1
2708 1014 TAD DATFLD
2711 1125 TAD KCDF
2712 3313 DCA "1
2713 6201 CDF 00 /RESTORE DATA FIELD
2714 7200 CLA I STALL /EXIT
2715 5702 JMP I STALL /EXIT

2716 0000 GENRAN, 0 TAD RANTAB
2717 1354 CIA
2720 7041 TAD RANDEX
2721 1342 SZA CLA
2722 7640 JMP RANTAD=1
2723 5333 TAD TBLRAN
2724 1355 DCA RANDEX
2725 3342 TAD RANCON
2726 1341 CLL RAL
2727 7104 S2L
2730 7430 TAD K1
2731 1150 DCA RANCON
2732 3341 TAD I RANDEX
2733 1742 TAD RANCON
2734 1341 RANTAD, TAD RANDON
2735 3742 DCA I RANDEX
2736 1742 TAD I RANDEX
2737 2342 ISZ RANDEX
2740 5716 JMP I GENRAN

/ RANCON, 1234
RANDEX, RANTBL+10
RANTBL, 4321
1416
5363
6060
3035
2572
3237
0214
0
RANTAB, "1
TBLRAN, RANTBL
K177, 177

3412-2741 1234
-2742 2753
-2743 4321
-2744 1416
1416
5363
6060
3035
2572
3237
0214
0
2754 2753
2755 2743
2756 0177

2353 -
7150 -
3415 -
4112 -
1027 -
0624 -
1271 -
c246 -
2752 0214
2753 0000
2754 0000
2755 0177

/ROUTINE TO DETERMINE FIELD FOR RELOCATION

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```
3020 4531 CMOVE, JMS 1 XFIELD /SET OF TO CURRENT FIELD
3021 7600 TAD ERtbl /SETUP ERROR TABLE POINTER
3022 1020 DCA ERWrd /FIRST TESTED FIELD
3023 3022 TAD FIRST1
3024 1123 CIA LAST1 /LAST TESTED FIELD
3025 7041 TAD SNA CLA /DON'T MOVE IF EQUAL
3026 1124 TAD JMP 1 XRTN /START OVER
3027 7650 TAD RAR FLAGS
3028 5530 TAD SZL /FIRST MOVE IF A SKIP
3029 7010 TAD JMP 1 XTMV /SETUP FOR NEXT MOVE
3030 7430 TAD IAC SET BIT 11
3031 7015 TAD DCA FLAGS
3032 7016 TAD LAST1 /LAST TO TEST # 1ST MOVE
3033 7016 DCA INSFld /NEW CURRENT FIELD
3034 7041 TAD INSFld
3035 1016 TAD M10
3036 3151 DCA NXLOC
3037 1124 TAD RIF
3038 7041 TAD INSFld
3039 1016 CIA CLA
3040 7650 TAD SUB1
3041 5266 SNA CLA
3042 7041 SNA CLA
3043 5253 TAD STMV
3044 1022 TAD ERWrd
3045 7041 CIA ENtbl
3046 1021 TAD ENtbl
3047 7650 SNA CLA
3048 5310 JMP STMV
3049 2022 TAD ERWrd
3050 5253 CIA CLA
3051 2022 TAD ERWrd
3052 5237 CIA CNXT
3053 7041 TAD ENtbl
3054 5310 JMP STMV
3055 2022 TAD ERWrd
3056 5237 CIA CNXT
3057 1422 TAD 1 ERWrd
3058 7041 CIA INSFld
3059 1016 SNA CLA /ERROR IN NEW FIELD IF 0
3060 7650 TAD ERWrd
3061 5253 CIA CLA
3062 7041 TAD ERWrd
3063 1422 CIA ENtbl
3064 7650 SNA CLA
3065 5310 JMP STMV
3066 2022 TAD ERWrd
3067 5237 CIA CNXT
3068 1422 TAD 1 ERWrd
3069 7041 CIA INSFld
3070 1016 SNA CLA /TABLE DONE IF 0
3071 7650 TAD ERWrd
3072 5310 CIA ENtbl
3073 2022 TAD ERWrd
3074 5237 CIA CNXT
```

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3053 1422 TAD I ERW0 /EQUAL, TAD I ERW0 /GET ERROR FIELD
3054 7041 CIA FIRST1
3055 1123 TAD FIRST1
3056 7650 SNA CLA /DON'T MOVE IF = TO FIRST
3057 5530 JMP I XRTN /START OVER
3060 1422 TAD I ERW0
3061 7650 SNA CLA /IS IT FIELD 0?
3062 5266 JMP SUB1 /YES
3063 1016 TAD INSFLD /CURRENT NEXT
3064 1141 TAD M10 /SUBTRACT 1 FROM OF
3065 3151 DCA NXLOC

3066 1020 TAD ERTBL /RESTORE TABLE POINTER
3067 3022 DCA ERWD
3070 1151 TAD NXLOC
3071 7041 CIA
3072 1016 TAD INSFLD
3073 7650 SNA CLA /NEXT = CURRENT NEXT IF =
3074 5253 JMP EQUAL
3075 1151 TAD NXLOC
3076 3016 DCA INSFLD /NEW CURRENT FIELD
3077 1016 TAD INSFLD
3100 7041 CIA
3101 1123 TAD FIRST1
3102 7650 SNA CLA /IS IT = LOWEST FIELD
3103 5251 JMP CKERR
3104 1016 TAD INSFLD /YES
3105 1141 TAD M10 /CURRENT NEW FIELD
3106 3151 DCA NXLOC /SUBTRACT 1 FROM OF
3107 5251 JMP CKERR /NEXT FIELD LOWER

3110 7200 CLA /STMV.
3111 1020 TAD ERTBL
3112 3022 DCA ERWD
3113 6224 RIF
3114 3723 DCA I XSRCE
3115 1723 TAD I XSRCE
3116 7041 CIA
3117 1016 TAD INSFLD
3120 7650 SNA CLA /DON'T MOVE IF EQUAL
3121 5530 JMP I XRTN /START OVER
3122 5724 JMP I XMVE /GO MOVE

3123 3323 XSRCE, SOURCE
3124 3307 XMVE, MOVE
3125 3200 XTMV, NXTMV,
/ *3200
3200 7600 NXTMV, 7600

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3201 6224 RIF SOURCE /CURRENT FIELD
3202 3323 DCA ERWD /INITIALIZE *1
3203 2022 CHNXT,
3204 1200 TAD NXTHV
3205 7041 CIA ! ERWD
3206 1422 TAD ! ERWD
3207 7650 SNA CLA /NO ERRORS RECORDED IF 0
3210 5225 JMP STNXT /INITIALIZE MOVE
3211 1422 CKNXT,
3212 7041 CIA ! ERWD
3213 1151 TAD NXLOC
3214 7650 SNA CLA /ERROR IN NEW FIELD IF 0
3215 5255 JMP SUB2 /TRY NEXT LOWER FIELD
3216 1022 TAD ERWD
3217 7041 CIA ! ERWD
3220 1021 TAD ENTBL
3221 7650 SNA CLA /DONE WITH TABLE IF 0
3222 5225 JMP STNXT /INITIALIZE MOVE
3223 2022 TAD ERWD /POINTER +1
3224 5241 CIA ! ERWD
3225 1022 TAD ERTB
3226 3022 DCA ERWD /RESTORE TABLE POINTER
3227 1151 TAD NXLOC /NEXT LOWER FIELD
3230 7041 CIA ! NSFLD
3231 1016 TAD INSFLD
3232 7650 SNA CLA /NEXT & CURRENT IF 0
3233 5242 CKNT,
3234 1151 TAD NXLOC
3235 7041 TAD FIRST1
3236 1123 TAD CLA /NEXT = LOWEST IF 0
3237 7640 JMP STNXT /MOVE TO LOWEST TEST FIELD
3240 5247 TAD FIRST1
3241 5302 TAD MVBK
3242 1151 CKNT,
3243 7041 TAD NXLOC
3244 1123 CIA ! ERWD
3245 7650 SNA CLA /NEXT = LOWEST IF 0
3246 5275 JMP NXTH1 /SETUP TO MOVE TO HIGHEST
3247 1151 TAD NXLOC /NEXT LOWER FIELD
3250 3016 CIA ! NSFLD /IS NOW CURRENT FIELD
3251 1016 TAD M10
3252 1141 DCA NXLOC /SUBTRACT 1 FROM NEW
3253 3151 JMP MOVE /NEW NEXT LOWER FIELD
3254 5307 TAD M10 /GO MOVE

/ SUB2,
3255 1020 TAD ERTB
3256 3022 DCA ERWD /RESTORE TABLE POINTER
3257 1151 TAD NXLOC /NEXT LOWER FIELD
3260 7450 SNA JRTN /FIELD S IF 0
3261 5530 JMP I XRTN /START OVER CAN'T MOVE
3262 1141 TAD M10 /SUBTRACT 1

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/ / / / /

3263 3151 DCA NXLOC /NOW # 2 FIELDS LOWER
3264 1151 TAD NXLOC
3265 7041 CIA
3266 1016 TAD INSLFD /CURRENT FIELD
3267 7640 SZA CLA /ARE THEY EQUAL
JMP CHNXT /NO
3270 5203 TAD NXLOC /YES
3271 1151 SNA /DOES IT = FIELD ?
3272 7450 JMP CHNXT /YES
3273 5203 JMP SUB2+5 /NO
3274 5262 /
3275 1124 NXTHI, TAD LAST1 /VERY LAST TO TEST
3276 3151 DCA NXLOC /MAKE IT NEXT FIELD
3277 1124 TAD LAST1
3300 3016 DCA INSLFD
3301 5203 JMP CHNXT
3302 1151 /
3303 3016 TAD NXLOC
3304 6224 DCA INSLFD
3305 3323 RIF
3306 3015 DCA SOURCE
DCA FLAGS /CLEAR BIT 14
/ / ROUTINE TO RELOCATE 4K FIELDS
3307 1125 MOVE, TAD KCDF /6201
3310 1323 TAD SOURCE /CURRENT FIELD
3311 3323 DCA SOURCE /SOURCE NOW = CDF N
3312 1425 TAD KCDF /6201
3313 1016 TAD INSLFD /NEW FIELD
3314 3327 DCA DESTN /DESTN NOW = CDF N
3315 1323 TAD SOURCE
3316 7041 CIA
3317 1327 TAD DESTN
3320 7650 SNA CLA
3321 5530 JMP IXRTN
3322 3074 DCA LOOP /WILL = CDF N
3323 0000 SOURCE, 0 /4K COUNTER
3324 1474 TAD I LOOP
3325 3347 DCA SAVGD
3326 1347 TAD SAVGD
3327 0000 DESTN, 0 /TAKE FROM HERE
3328 3474 DCA I LOOP
3329 1474 TAD I LOOP
3330 3474 CIA
3331 7041 TAD SAVGD
3332 1347 SNA CLA
3333 1347 JMP ,+3
3334 7650 HLT
3335 5340 JMP SOURCE
3336 7402 JSZ LOOP
3337 5323 JMP SOURCE
3342 2074 JMP SOURCE
3341 5323 TAD KCIF
3342 1126 /KEEP MOVING
/ / / / /

/

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3343	1016	TAD INSFLD	/NEW FIELD	
3344	3345	DCA :+1		
3345	6202	CIF 00	/CHANGE TO NEW FIELD	
3346	5530	JMP I XRTN	/EXIT TO RTN1 IN	
3347	0000	SAVGD, 0	/NEW FIELD	
		\$		

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4200	4202	4102
4202	4202	4302
4400	4400	4500
4600	4602	4700
5000	5000	5100
5200	5200	5300
5400	5400	5500
5600	5600	5700
6000	6000	6100
6200	6200	6300
6400	6400	6500
6600	6600	6700
7000	7000	7100
7200	7200	7300
7400	7400	7500
7600	7600	7700

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V141	2220	FLCNT	0073	LEGAL	2314
	2273	FLDN	2444	LCAT	2480
	2163	FLOAD	0017	LOOP	0074
	2634	GENRAN	2716	M10	0141
	BEGIN	GOOD	2555	M14	0140
	BSPCE	HALT	2164	M20	0056
	CBANK	INSFLD	2641	M4	0060
	CDF	JMS1	0016	M40	0057
	CDON1	JMS2	0110	M5	0061
	CFLD	JMS3	0111	MCHA	0033
	CHAR	JMS4	0112	MEMADR	0122
	CHNXT	JMS5	0113	MOVE	3307
	CIF	K1	0114	MVBK	3302
	CKBNK	K100	0150	NXLLOC	0151
	CKERR	K100	0034	NXTBNK	1624
	CKNT	K100	0040	NXTHI	3275
	CKNXT	K177	2956	NXTMV	3200
	CLOP1	K1K	1036	OADDR	2165
	CLOP2	K20	0042	OKAS	2256
	CLOP3	K200	0037	OTLDR	2541
	CLOP4	K207	2167	OVER	1706
	CMOVE	K212	2171	PBAD	2605
	CNXT	K215	0143	PFILD	2500
	COUNT	K240	2170	PGOOD	2324
	CRLF	K254	2353	PHDR	2474
	DATFLD	K260	0142	PLIMT	2452
	DESTN	K261	0052	PLCOT	2512
	ENTBL	K262	0053	POCDR	2512
	EPRNT	K263	0054	POSITN	2131
	EQUAL	K264	0055	PRERR	2146
	EREXT	K277	0146	PRGAM	2417
	ERROR	K370	0145	PROCTL	2126
	ERTBL	K377	0144	PSTSR	2652
	ERWRD	K400	0041	PTSTN	2617
	EXAM1	K400	0036	QUERY	2344
	EXAM2	K7	0133	RANCON	2741
	EXAM3	K740	0035	RANDEX	2742
	EXAM4	KCDF	0125	RANTAB	2754
	EXHDR	KCIF	0126	RANTAD	2734
	EXIT	K230	0303	RANTBL	2743
	EXT1	K232	0304	RCHHK1	01037
		K343	0345	RCHHK1C	01034
	EXT2	K423	0125	RCHHK2	01071
		K445	0126	RCHHK2C	01106
	EXT3	K475	0303	RCHHK3	01123
		K517	0322	RCHHK3C	01140
	EXT4	K623	0523	RCHHK4	01200
		K647	0645	RCHHK4C	01217
	FEILD	K646	0646	RCHKA	01000
	FILD	K740	0646	RD1	1245
	FIRST1	K123	0124	RD2	1322
		K015	0154	RD3	1400
	FLAGS			XBANK	0063

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	XCFL	1244	XTST3	0046
	XCHK1	0076	XTST4	0047
	XCHK1C	0077		
	XCHK2	0100		
	XCHK2C	0101		
	XCHK3	0102		
	XCHK3C	0103		
	XCHK4	0104		
	XCHK4C	0105		
	XCHKA	1236		
	XCRLF	0147		
	XFILD	0131		
	XHDR	0135		
	XHLT	0127		
	XIT1	0320		
	XIT1C	0341		
	XIT2	0421		
	XIT2C	0443		
	XIT3	0473		
	XIT3C	0515		
	XIT4	0621		
	XIT4C	0643		
	XKBNK	0070		
	XLCAT	2352		
	XLMTS	0043		
	XLOPA	1237		
	XLOPB	1240		
	XLOPC	1241		
	XLOPD	1242		
	XLOPE	1243		
	XMOVE	0050		
	XMVE	3124		
	XPERR	0136		
	XPHDR	2644		
	XPING	0137		
	XPRER	0132		
	XRALL	0075		
	XRD1	0115		
	XRD2	0116		
	XRD3	0117		
	XRD4	0120		
	XRROR	0121		
	XRTN	0130		
	XSALL	0152		
	XSETU	0051		
	XSRCE	3123		
	XSTSRR	0277		
	XTBNK	0071		
	XTLIM	2351		
	XTMV	3125		
	XTST1	0044		
	XTST2	0045		

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ERRORS DETECTED: 0

LINKS GENERATED: 0

RUN-TIME: 13 SECONDS

2K CORE USED.